

A New R-390A AGC Mod

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1/21/05, rev. 1/22/05

Over the years I have developed two AGC mods for improved SSB and ECSS, (1) a simple improved version of the AGC mod attributed to Cornelius, and (2) a more elaborate improvement of the Cornelius mod with the help of Wally K5OP. The more elaborate version involved removing the Miller effect SLOW AGC part of the R-390A AGC (which increased the SLOW attack time constant), and changing the MED and SLOW release times to about 830 mS and 2 S respectively. For many late model EAC R-390A's component and wiring harness layout made it difficult, if not impossible, to implement the SLOW part of mod 2, so an alternate mod was given for those EAC's. I never liked the alternate EAC SLOW variation because it involved using two capacitors in series, and required that the large old 2 mF C551 capacitor be used. Recently I found a way to avoid using C551 so that all AGC time constant capacitors can be new. It also allows you to easily choose whatever SLOW release time constant you want. This new R-390A AGC mod is given below.

The release time constant is given by the formula $T \text{ (in seconds)} = 1.77 C$ where C is in microFarads and C is the capacitor for SLOW, MED, or FAST (labeled C_S , C_M , and C_F on the schematic below). For the capacitor values I have used, namely 0.10, 0.47, and 1.47 mF, the release times are 177 mS, 832 mS, and 2.6 S respectively. FAST is for band scanning, MED is for SSB, CW, and AM when there is strong QRN and QRM or for steady AM, and SLOW is for SSB, CW, and strongly fading AM. I used high quality 250 volt metalized film capacitors.

The solder work around the IF plug lugs is somewhat difficult. Use a small iron and be careful not to burn insulation on the many wires that connect to nearby lugs. If you do not have a steady hand, place several layers of aluminum foil over and around the nearby wires. You can probably tell if you did the mod correctly just by tuning in various signals with your newly modified R-390A. Tune a strong signal, and then tune away quickly to a weak (or no) signal. In the SLOW release AGC switch setting the carrier meter should fall slowly to the lower value (you should be able to count at least 1001, 1002, and 1003 before it falls to no signal value). For the MED setting, the carrier meter should fall more quickly, and for the FAST setting it should fall almost instantly to no signal value. Then tune around and listen to signals of various strengths, especially stronger AM signals. If there is audio distortion, you may not have done the mod correctly... or there may be some other problem unrelated to the mod. I just finished doing this mod for a 3rd time and when I put the newly modified IF deck in an R-390A and turned it on, I got too low (and too high!!) carrier meter readings and bad distortion on some AM signals. I measured the AGC voltages both for the newly modified IF deck and a known good one, and the new one had way too low AGC voltages, as I suspected. While I was trouble shooting it, it "cured itself," which I didn't like (intermittent problems are the worst kind). I replaced the 0.1 cap I had put in, just in case, and it has now been burning in with no further problems.

Though good, the attack time in the SLOW AGC position is not fast enough for excellent SSB. Fortunately, a simple external audio derived AGC mod developed by K5OP solves this problem, and together with this mod provides truly outstanding SSB fast attack and slow release AGC. The K5OP audio derived AGC mod will be described in a separate short article.

When you do this AGC mod, add a 47 pF 500 V silver mica in parallel with the 12 pF BFO injection capacitor C535 for further reduced SSB distortion.

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